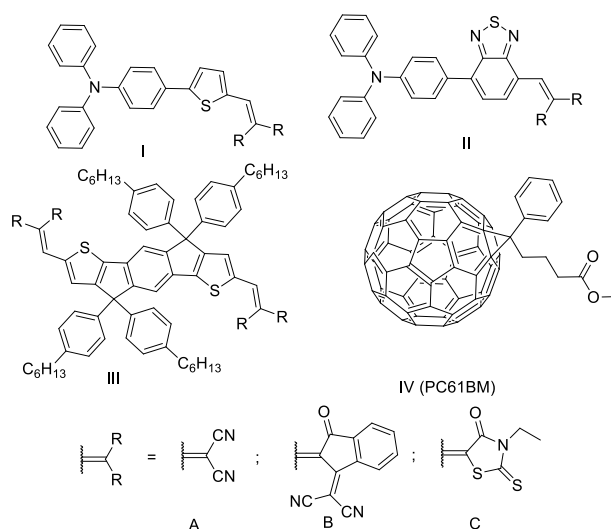


Results obtained in the period November 2020-December 2021

Elaboration of requested materials for the obtaining of inverted OSC and of the modules of cells (2020).

The target donors and acceptors (Scheme 1) were synthesized and characterized by CV, absorption and emission spectra.



Scheme 1

Design, fabrication and test of the modules of OSCs

The theoretical model of an isolated cell was elaborated (Figure 1)

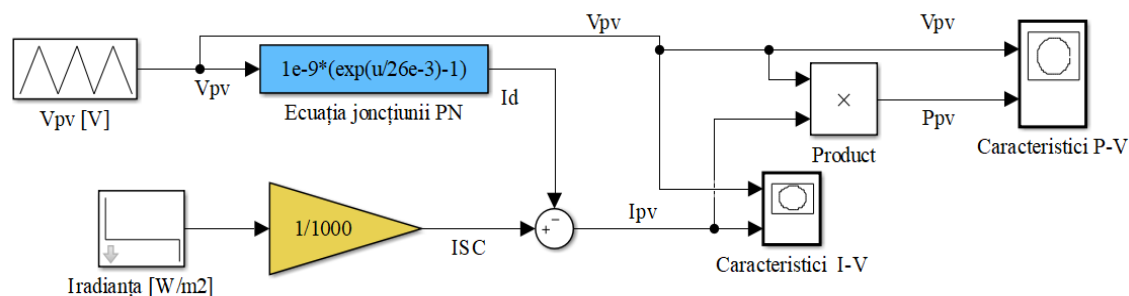


Figure 1. Simulink model of a SC (solar cell).

The dissemination was carried out by 4 papers presented in conferences:

1. Mihnea-Antoniou Covaci, Lorant Andras Szolga: "Implementation of Parallel PSO for Synchronous Constant Current Converter", Conference: 2020 IEEE 3rd International Conference and Workshop in Óbuda on Electrical and Power Engineering (CANDO-EPE), November 2020, DOI: [10.1109/CANDO-EPE51100.2020.9337798](https://doi.org/10.1109/CANDO-EPE51100.2020.9337798)
2. Mihnea-Antoniou Covaci, Lorant Andras Szolga: "High Power Laser Tracking and Targeting System", Conference: 2020 IEEE 3rd International Conference and Workshop in Óbuda on Electrical and Power Engineering (CANDO-EPE), November 2020, DOI: [10.1109/CANDO-EPE51100.2020.9337755](https://doi.org/10.1109/CANDO-EPE51100.2020.9337755)
3. Lorant Andras Szolga, Mihai Boca: "Smart Illumination for Large Area Buildings Using RF Communication", Conference: 2020 International Symposium on Electronics and Telecommunications (ISETC), November 2020, DOI: [10.1109/ISETC50328.2020.9301143](https://doi.org/10.1109/ISETC50328.2020.9301143)

4. Lorant Andras Szolga, Ionut Pavelea: “Security System with High Autonomy of Operation”, Conference: 2020 International Symposium on Electronics and Telecommunications (ISETC), November 2020, DOI: [10.1109/ISETC50328.2020.9301044](https://doi.org/10.1109/ISETC50328.2020.9301044)

Access to OSCs on flexible support and to the electronic power supply (2021)

The donors and acceptors investigated in the previous stage were obtained in large scale.

The classic bulk inverted cells having our donors and PC61BM as acceptor were obtained and investigated either on glass (a) or PET (b) supports (Figure 2). The efficiencies (PCE values) were close in the two types of cells)

Glass (PET)/ITO/ZnO/Donor:PC₆₁BM/MoO₃/Al

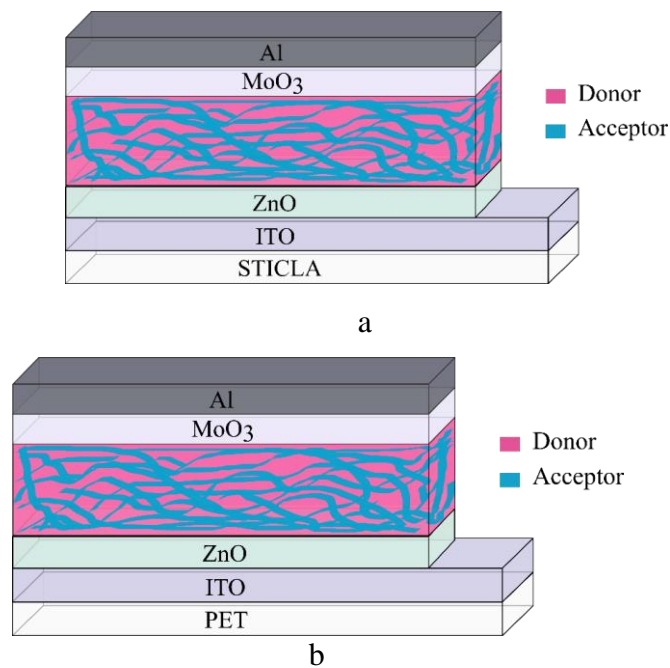


Figure 2. Inverted Bulk OSCs on glass (a) or PET (b) supports

Elaboration and fabrication of the batteries of cells

In the first step the simulation of the formation of the batteries of cells was made using specific programs (Figure 3)

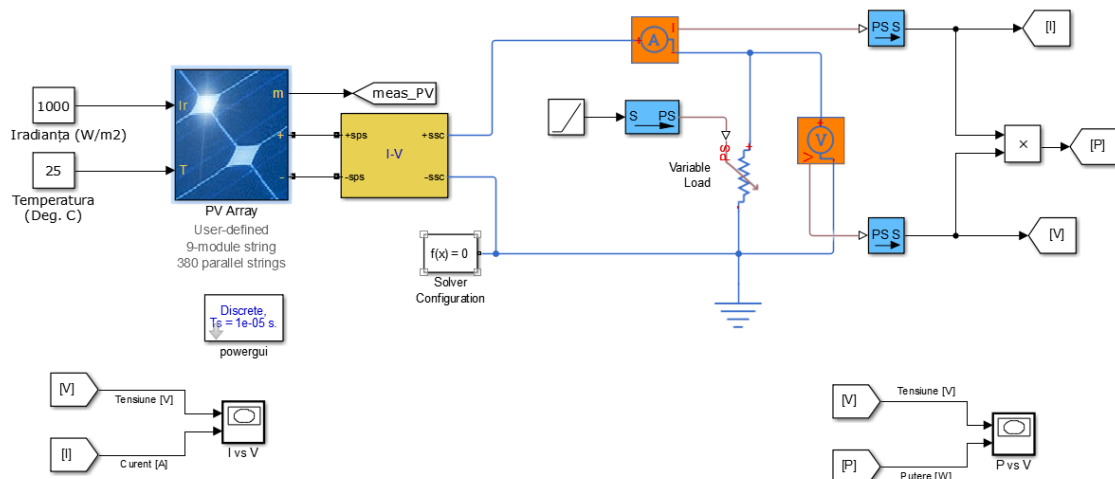


Figure 3. Simulink model for the array of connected OSCs

Design, fabrication and testing of the charging system

A system which allows the charging of 2 supercapacitors in parallel connection able to act as power supply for medical devices was elaborated and tested (figures 4 and 5)

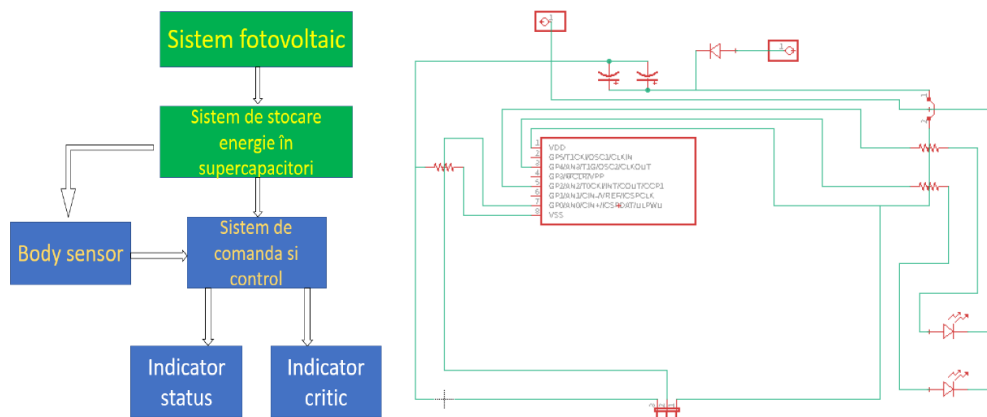


Figure 4. Scheme of a monitorization system based on two supercapacitors.

The system contains two supercapacitors, a photovoltaic cell, a microcontroller, two leds and a temperature sensor LMT86.

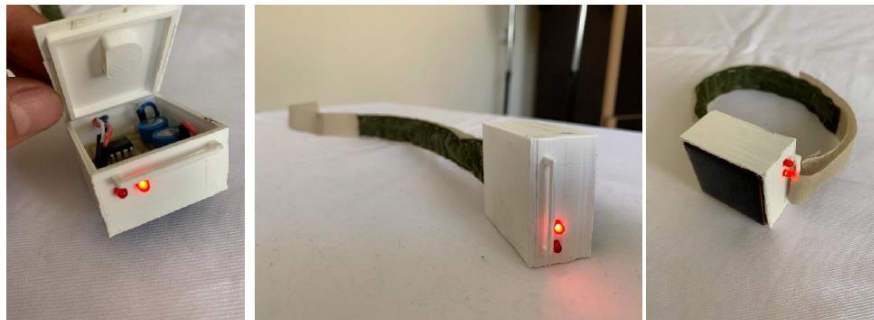


Figure 5. The model of the device for the monitorization of the body temperature based on two supercapacitors and a solar cell.

Design, fabrication and testing of the power supply and controller system (DC-DC controller)

The Simulink model (figure 6) of a Buck convertor with supercapacitor and electrical parameters 5V/0.5A was elaborated and then tested with an on-body sensor working at 3.3V.

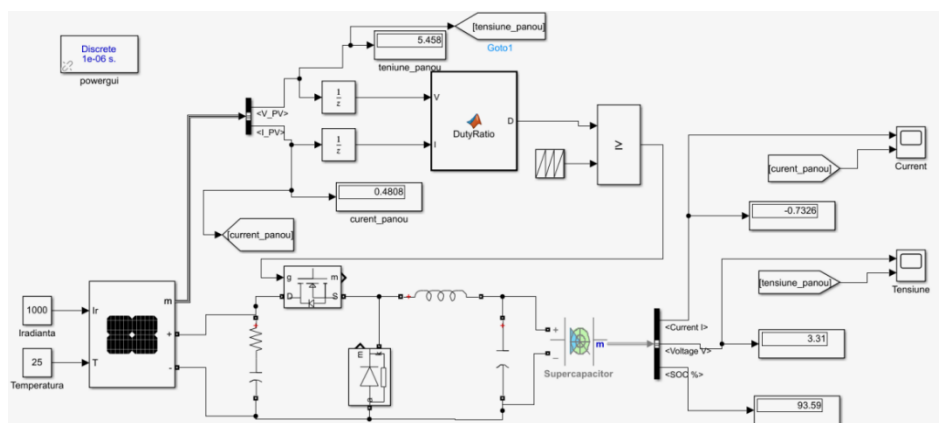


Figure 6. Simulink model of buck convertor with supercapacitor.

Dissemination: an ISI publication and the participation at conferences with 8 papers.

- 1 Gavril-Ionel Giurgi, Lorant Andras Szolga, Andreea Crişan, Ion Grosu, Jean Roncali: “Photovoltaic performances of two triarylamine-based donors in various inverted cell configuration”, Studia Univ. Babes-Bojyai, Chemia, 2021, 66 (3), 97-105 DOI:[10.24193/subbchem.2021.3.05](https://doi.org/10.24193/subbchem.2021.3.05)
- 2 Mihnea-Antoniou Covaci, Lorant Andras Szolga: “Hampson-Linde Cryogenic Cooler Modeling and Optimization in Matlab/Simulink”, Conference: 2021 6th International Conference on Smart and Sustainable Technologies (SpliTech), DOI:[10.23919/SpliTech52315.2021.9566388](https://doi.org/10.23919/SpliTech52315.2021.9566388)
- 3 Lorant Andras Szolga, T M Girbovan: “Photovoltaic Charged Supercapacitor Power Supply for On-Body Sensors”, Journal of Physics Conference Series 2016(1):012004, September 2021, DOI: [10.1088/1742-6596/2016/1/012004](https://doi.org/10.1088/1742-6596/2016/1/012004)
- 4 Lorant Andras Szolga, Florin Mudure: “Temperature Sensor Using a Hybrid Structure with Plastic Optical Fiber and Bimetal Element”, Conference: 2021 13th International Conference on Electronics, Computers and Artificial Intelligence (ECAI), July 2021, DOI: [10.1109/ECAI52376.2021.9515030](https://doi.org/10.1109/ECAI52376.2021.9515030)
- 5 Lorant Andras Szolga: “Humidity and Isopropyl Alcohol Detection Sensor Based on Plastic Optical Fiber”, Conference: 2021 25th International Conference Electronics, June 2021, DOI: [10.1109/IEEECONF52705.2021.9467472](https://doi.org/10.1109/IEEECONF52705.2021.9467472)
- 6 Lorant Andras Szolga, Mihai Boca: “LED Display for Timetables Controlled by IoT”, Conference: 2021 International Conference on Electrical, Communication, and Computer Engineering (ICECCE), June 2021, DOI: [10.1109/ICECCE52056.2021.9514219](https://doi.org/10.1109/ICECCE52056.2021.9514219)
- 7 Lorant Andras Szolga, Teodor Radu Cilean: “Water Sterilization Using Power UV LEDs”, Conference: 2021 8th International Conference on Electrical and Electronics Engineering (ICEEE), April 2021, DOI:[10.1109/ICEEE52452.2021.9415965](https://doi.org/10.1109/ICEEE52452.2021.9415965)
- 8 Lorant Andras Szolga, C A Stan: “Plexiglass glove box for organic solar cells”, IOP Conference Series Materials Science and Engineering 1032:012048, January 2021, DOI: [10.1088/1757-899X/1032/1/012048](https://doi.org/10.1088/1757-899X/1032/1/012048)
- 9 Lorant Andras Szolga, George Flueraş: “Robotic arm controlled by Android app through Bluetooth connection for organic solar cell manipulation”, IOP Conference Series Materials Science and Engineering 1032:012048, January 2021, DOI: [10.1088/1757-899X/1032/1/012049](https://doi.org/10.1088/1757-899X/1032/1/012049)